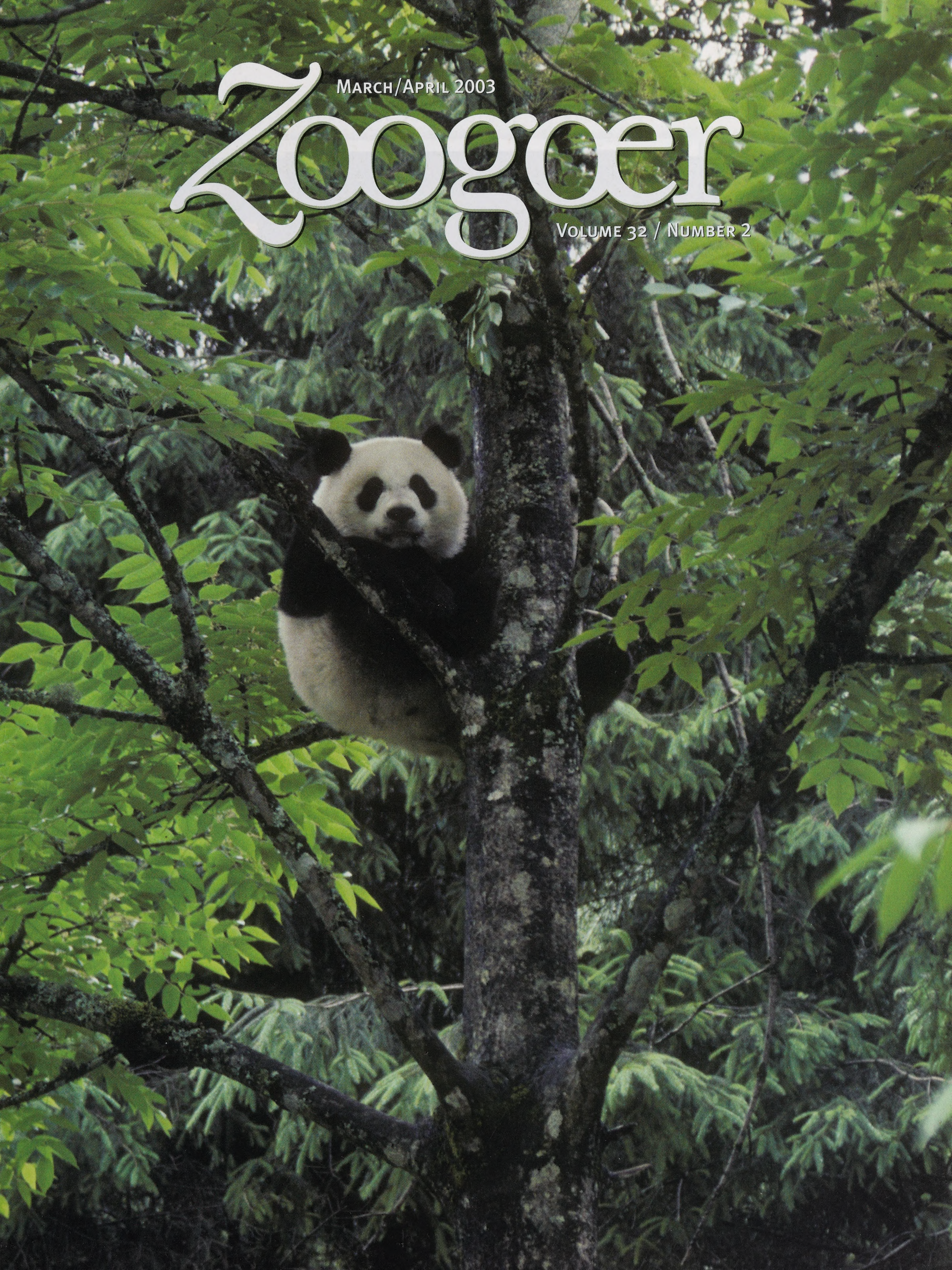
March/April 2003

Zoogoer

Volume 32 / Number 2



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In an effort to secure their future in China and North America, Fujifilm is proud to sponsor the future home of two giant pandas at the Smithsonian's National Zoo. Mei Xiang and Tian Tian will be housed in a state-of-the-art facility under the care of the National Zoo. Fujifilm recognizes that although photography is wonderful for preserving memories, it can never replace the real thing. www.fujifilm.com

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In celebration of Asia Trail and ZooFari 2003, this issue features a photo essay highlighting the Smithsonian National Zoo's collection of Asian species, as well as its science and conservation programs in Asia.

BY HOWARD YOUTH

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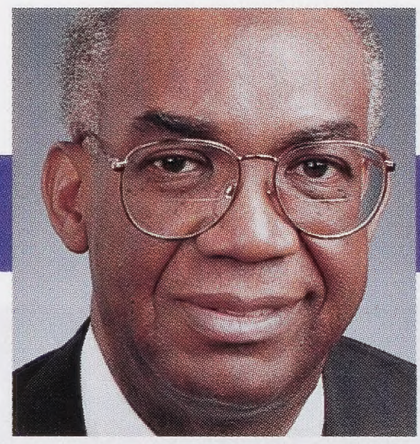

FONZ FORUM

THE ZOO I KNOW

The negative portrayal of the National Zoo in the media regarding a series of animal deaths is certainly at odds with the reality of the National Zoo that I experience firsthand every day. The Zoo I know is a recognized leader in animal care and zoological medicine, and is a true national treasure.

Every day I see dedicated National Zoo staff who are passionately committed to ensuring the well-being of the animals in their care. And, in fact, *The Washington Post* article that appeared on February 27 describing the herculean efforts of Zoo staff to take care of the animals during the Presidents' Day weekend blizzard revealed that they will go to any lengths for the good of the animals. (Go to http://www.washingtonpost.com/wp-dyn/articles/A62731-2003Feb24.html to read the article.)

Every day I also see people marveling at our giant pandas and Asian elephants. I see families enjoying a stroll through our beautiful park. I see kids eager to learn about wildlife in our classes and camps, and teachers leading field trips to enhance their biology lessons. I see business people come by during their lunch breaks to see their favorite cheetah or giraffe. All told, more than two million visitors each year find the National Zoo a great place to be, as do the almost 90,000 FONZ members and 1,200 volunteers who know the Zoo better than most.

I have also observed firsthand how tirelessly Zoo Director Dr. Lucy Spelman has worked to revitalize the Zoo so we can better fulfill our mission to study, celebrate, and protect wild animals and their habitats. The changes she has affected in her less than three years on the job have been amazing: new animals at the Zoo, including the beloved giant pandas; ambitious plans for upgrading or replacing badly deteriorating facilities, such as a sloth bear habitat built more than a century ago; and new support for conservation research on giant pandas, Asian elephants, and more.

I am confident that the upcoming independent investigation by the National Academy of Sciences will reveal that the Zoo is fundamentally sound, and moving rapidly forward to correct any problems. My confidence is further bolstered by the Zoo's statement that it welcomes increased oversight by the USDA, whose input I believe will only enhance our efforts to restore the Zoo to world-class status. (For updated information on current events at the Zoo, please visit our website, http://www.fonz.org, regularly.)

Inevitably, zoo animals die, due to illness or old age. Inevitably, too, there will be a rare accidental death, like those of the red pandas and zebras, due to human error. This does not alter the reality: the National Zoo is becoming a far better place for our animals and our visitors, while leading conservation efforts to make the world a far better place for all of us.

Sincerely,

Clinton A. Fields
Executive Director

P.S. Please join us in support of the Zoo's ten-year revitalization plan, by attending our annual fundraiser, National ZooFari! Scheduled for May 15, this year's ZooFari celebrates "Asia Fantasia" to highlight the planned new Asia Trail at the Zoo (see page 6). To complement Asia Fantasia, this issue of *ZooGoer* explores the diverse conservation and science projects conducted by Zoo staff. These groundbreaking projects will continue and expand in the coming years as part of the Asia Trail program.

Friends of the National Zoo is a non-profit organization dedicated to supporting the conservation, education, and research efforts of the Smithsonian's National Zoo. Formed in 1958, FONZ was one of the first conservation organizations in the nation's capital. Friends of the National Zoo is dedicated to supporting the Smithsonian's National Zoo in a joint mission to study, celebrate, and help protect the diversity of animals and their habitats.

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Smithsonian ***National Zoological Park*** is located at 3001 Connecticut Ave., N.W., Washington, DC 20008-2537. Weather permitting, the Zoo is open every day except December 25. Hours: From May 1 to September 15, grounds are open from 6 a.m. to 8 p.m.; buildings, 10 a.m. to 6 p.m. From September 16 to April 30, grounds are open from 6 a.m. to 6 p.m.; buildings, 10 a.m. to 4:30 p.m.

Membership in FONZ offers many benefits: publications, discounts on shopping, programs, and events, free parking, and invitations to special programs and activities to make zoogoing more enjoyable and educational. To join, write FONZ Membership, National Zoological Park, Washington, DC 20008, call 202.673.4961 or go to www.fonz.org.

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LETTER FROM THE ZOO DIRECTOR

ASIA TRAIL: PROMISE AND PROGRESS

The first phase of Asia Trail is underway and we are very excited about our progress. I am proud of our entire Asia Trail project team, which includes a number of talented architect and design consultants who work closely with Zoo and FONZ staff. We have approved the preliminary drawings and are on track with our goal of awarding a construction contract in the fall of 2003.

Asia Trail supports our mission to celebrate, study, and protect animals and their habitats. The first major step in our ten-year renewal program, Asia Trail will consist of a revitalization of several of the Zoo's oldest (and failing) animal facilities and a significant upgrade to about one quarter of the Zoo. Asia Trail creates modern exhibits for several endangered species already in our collection. The first phase will house sloth bears, fishing cats, clouded leopards, red pandas, giant pandas, and one species that will be new to the Zoo, the giant salamander. The second phase will include a new facility for our growing Asian elephant herd.

Asia Trail is designed to be first-class for the animals, as well as the visitors. The animal habitats encourage natural behavior—including breeding—and ensure the best animal care. The visitor areas provide a peaceful, engaging, and educational experience. The Trail moves along a gentle grade with shaded areas and rest stops, with plenty of room to observe the animals or to stop and talk with Zoo interpreters. Exhibit graphics and interpretive elements along the Trail give visitors a sense of where each species is found in Asia, as well as a sense of the human cultures that share their native habitats. Throughout the entire Trail, interactive graphics infuse Smithsonian science into each exhibit, reinforcing our commitment to study and protect animals and their habitats.

A few details of Asia Trail are noted here, by way of example.

Entering the Trail near Connecticut Avenue, visitors first encounter the culture and animals of Nepal and Sri Lanka. The sloth bears' new enclosures offer water features as well as rocks and trees for climbing and sleeping. Looking through glass barriers, visitors can come within inches of the bears foraging for food in their digging pit. Foraging studies will be underway, aimed at gaining a better understanding of how this species is able to thrive in the wild on a diet of ants and termites. The new sloth bear house offers large indoor holding areas and incorporates sustainable design features such as solar panels for heating hot water. There is also room for sloth bear cubs.

Continuing along the Trail, visitors encounter fishing cats, clouded leopards, red pandas, giant salamanders, and giant pandas. While viewing the giant pandas, visitors can experience a waterfall, grotto, fogging system, and cool rock that mimic the features inside the Fujifilm Giant Panda Conservation Habitat. New and updated exhibits inside the giant panda house focus on two areas of Zoo-based panda science—reproduction and behavior. At the reproduction center, visitors learn about the panda life cycle and the work of our reproductive physiologists. The behavior research center offers an interactive map of the yards so visitors can see the features we have added and understand the preference studies on which they are based.

Throughout the Trail, educational materials engage individuals, families, and school groups in learning about Smithsonian science here at the Zoo and in the field. At either end of the Trail are a Conservation Hut and a Curiosity Station. The Conservation Huts focus on our efforts to save species and habitats on the ground in Asia by evoking life in rural India and Nepal at one end, and China at the other. The Curiosity Stations offer touch-screen computers that allow visitors to sign up for an email with additional information on their favorite Asia Trail topics. Visitors who sign up will receive an email from Zoo staff with links to the Zoo's website tailored to their interests, enabling them to continue to enjoy and learn about the Zoo and its animals after they've returned home.

In the meantime, while the Trail progresses, I encourage everyone to enjoy learning more about the animal species—and the science—on Asia Trail in this issue of *ZooGoer*, as well as on our website at http://nationalzoo.si.edu.

Lucy H. Spelman
Director
Smithsonian's National Zoological Park

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NOTES & NEWS

ZOO HAPPENINGS

Spring is just around the corner, and FONZ has a bevy of upcoming (and free!) events to whet your appetite for fun in the sun following a snowy winter season.

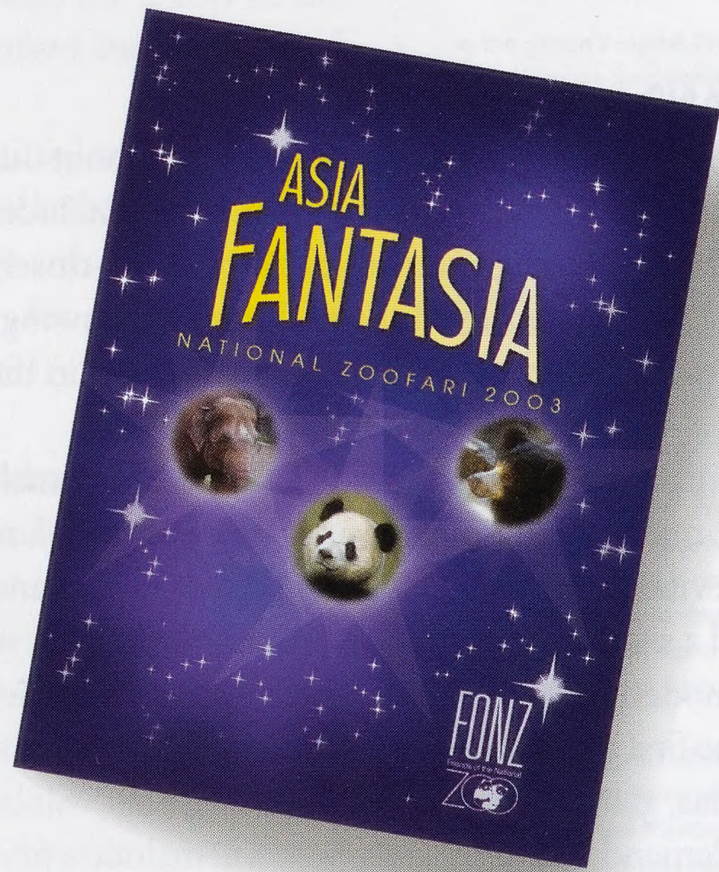
During the second weekend in April (April 12 and 13, from 10 a.m. to 4 p.m.), children of all ages will have the chance to discover the answers to intriguing zoological questions at FONZ's fifth annual **Focus on Science Weekend.** Sponsored by Fujifilm, this free event features the "Find Out Why?" game, in which kids participate in hands-on activities that teach them why bees are fuzzy, why beavers have flat tails, and the answers to many other interesting animal quandaries.

One of the longest running annual events held at the National Zoo, **African–American Family Celebration (Easter Monday)** will take place on Monday, April 21, from 10 a.m. to 4 p.m. Visitors can enjoy Easter-egg hunts, a food bazaar, live music, storytelling, special animal demonstrations, dance performances, and much more. A Washington multi-cultural tradition for 100 years, FONZ's Easter Monday event offers a fun-filled day for area families.

Held in conjunction with International Migratory Bird Day, **Bird Fest 2003** will take place at the Zoo on Saturday, April 26, and Sunday, April 27, from 10 a.m. to 4 p.m. This free event is hosted by the Zoo's Migratory Bird Center and is a celebration of migratory-bird conservation. A flock of educational and entertaining activities and exhibits will highlight efforts to protect the nearly 350 species of neotropical migratory birds that spend their summers in North America—and let you know what you can do to help.

Rounding out the lineup of fantastic spring events, FONZ will host its annual gala fundraisers, **Guppy Gala** and **ZooFari**. Taking place on Friday, May 9, from 6 to 8:30 p.m., Guppy Gala will feature its usual fun and games with live performers, many family-oriented activities, and a variety of food. Admission is $20 for FONZ members (adults and children), and $28 for nonmembers.

Then on Thursday, May 15, from 6:30 to 10 p.m., FONZ hosts ZooFari 2003. The theme of this year's event is "Asia Fantasia" in celebration of Asia Trail, the cornerstone of Lucy Spelman's ten-year Zoo revitalization plan. Although the theme is new, ZooFari will once again feature 100 of Washington's finest restaurants, along with live music, a sweepstakes, and a silent auction. Admission is $110 for FONZ members, and $135 for nonmembers—save $10 by reserving tickets by April 30. Proceeds from Guppy Gala and ZooFari benefit Zoo projects, including the development of Asia Trail.



Science & Conservation

ON THE ASIA TRAIL

Ancient Greeks looked to the East and named the shadowy space over the horizon Asia. Little did they realize that they were giving a single name to 30 percent of the planet's land area. This accident of history, perpetuated in our geography, makes it difficult to talk about a place called Asia, because it is so many places.

The world's tallest peak—Mount Everest—and lowest point—the Dead Sea—are in Asia. Its climate ranges from arctic to tropical, from very wet to very dry.

The continent features frigid tundra and torrid plains, arid deserts and wet rainforests, alpine meadows and coral reefs. Asia is composed of an immense landmass and thousands of islands. Asia's cultural and biological diversity mirrors its geographical diversity. There is no one Asian culture or Asian flora and fauna; there are many.

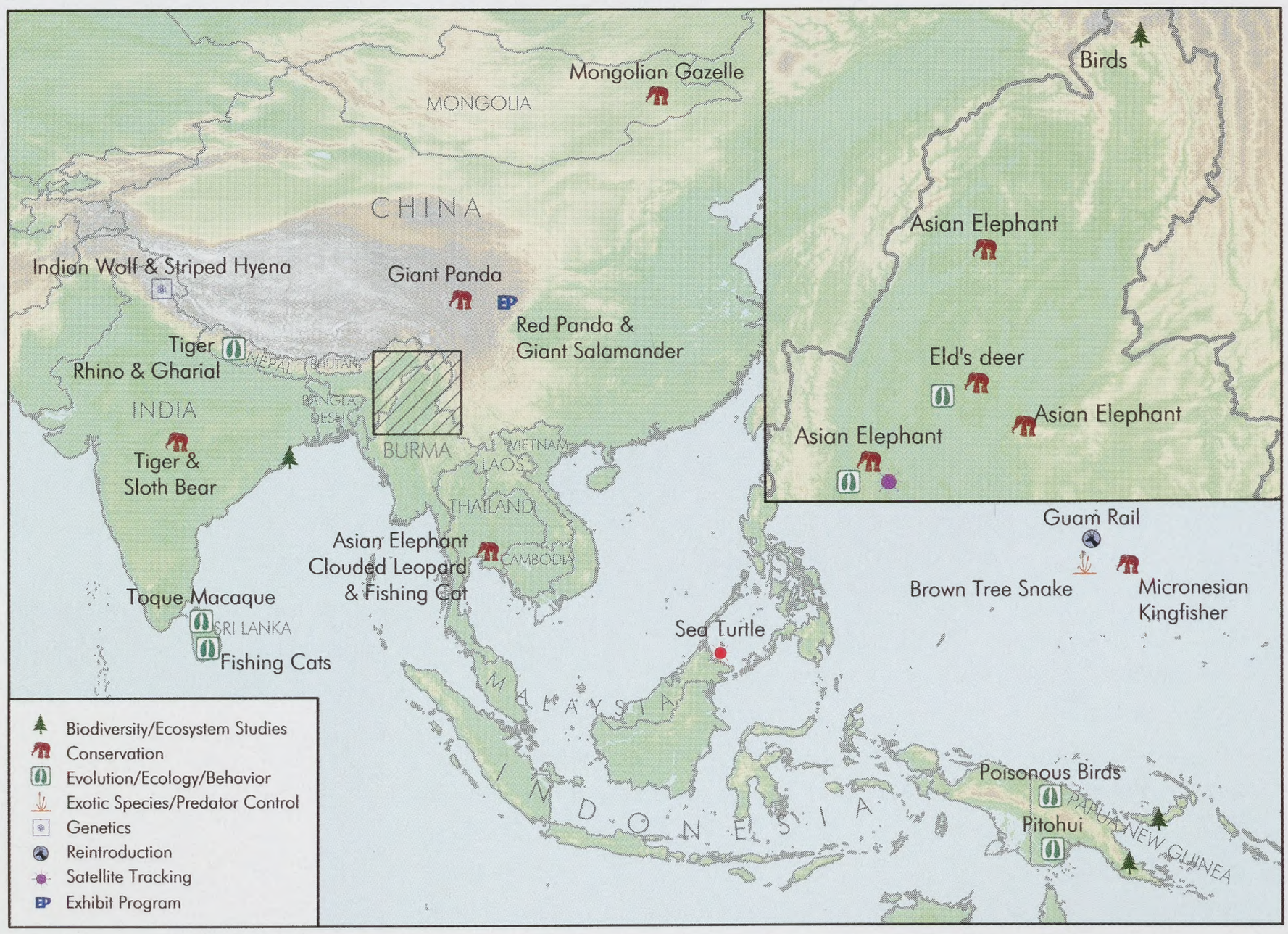
Unfortunately, many people in the Western world know little about anything Asian, apart from giant pandas and carryout food. So well known an Asian animal as the tiger is believed by many Americans to live in Africa. But at least we all recognize a tiger. What of other Asian creatures, like sloth bears and fishing cats and thamin? These names may evoke no particular images at all. Yet these and many other Asian species and their habitats are threatened by the pace of environmental change across that huge continent. If we don't learn about them now, we may lose the chance forever.

At the Smithsonian's National Zoological Park, we are hoping to prevent that frightening possibility. As part of a ten-year effort to revitalize the Zoo, we are planning a new Asia Trail. The Asia Trail will feature a series of exhibits for several Asian species in our collection that need new habitats, and whose conservation will be promoted by our research and education efforts both at the Zoo and in their native Asian homes.

Along with the new Fujifilm Giant Panda Conservation Habitat, first in the Asia Trail series will be a new habitat for our sloth bears, wonderful creatures that hail from the forests of India and Nepal. Ant- and termite-eaters, these bears are nearly as specialized as the bamboo-eating pandas and, once people see them in action, are likely to be as popular as pandas. Habitats for fishing cats, clouded leopards, red pandas, and giant salamanders are also in the plan.

Next, we will focus on Asian elephants. Not only do we plan to create a much larger space than the Zoo's three female elephants have now, we intend to build a facility where we can exhibit Kandula, who is well on his way to becoming a rambunctious adult male. While giant pandas, sloth bears, and Asian elephants will likely attract the most attention, we hope visitors will get to know many other Asian animals, whether they live on the Asia Trail or elsewhere in the Zoo. Komodo dragons, gharials, white-cheeked gibbons, orang utans, and Sumatran tigers are among the spectacular Asia species you can see at the Zoo.

But Zoo exhibits are like the western coast of Turkey that ancient Greeks first called Asia. There is far more going on at the Zoo than you can see. The National Zoo's science and conservation programs in Asia and for Asian species are nearly as diverse as the continent. They range from using satellite images to follow the migration of Mongolian gazelles in one of the largest temperate grasslands in the world to teasing apart the best way to freeze and thaw clouded leopard semen in a laboratory in Washington, D.C.



THIS MAP OF SOUTHEAST ASIA SHOWS THE VARIED ACTIVITIES OF THE NATIONAL ZOO IN THIS PART OF THE WORLD, INCLUDING STUDIES OF BIODIVERSITY, EVOLUTION, ECOLOGY, BEHAVIOR, GENETICS, AND CONSERVATION.

PETER LEIMGRUBER AND JENNIFER GAGNON NZP / CRC

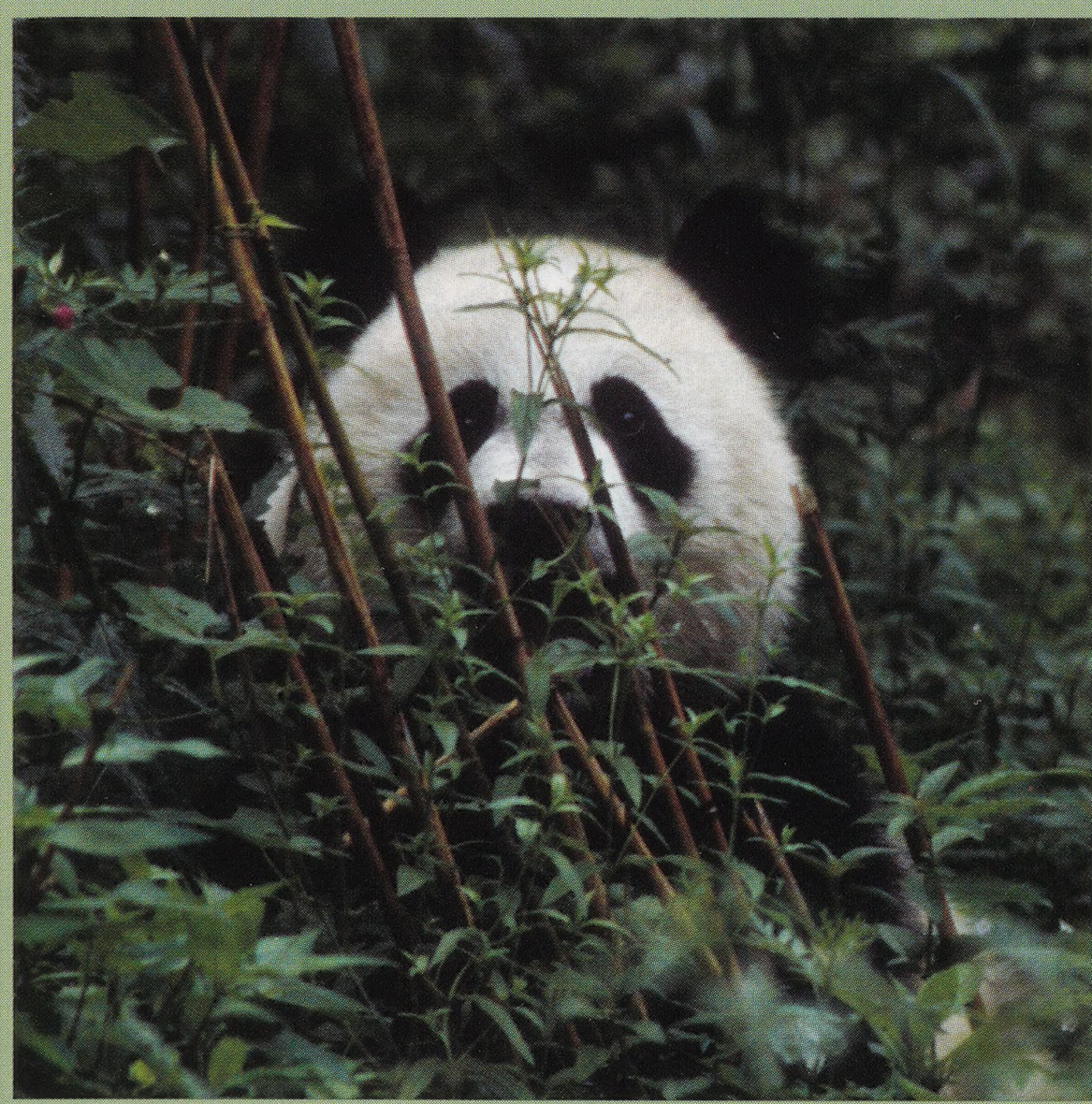
But Zoo exhibits are like the western coast of Turkey that ancient Greeks first called Asia. There is far more going on at the Zoo than you can see. The National Zoo's science and conservation programs in Asia and for Asian species are nearly as diverse as the continent. They range from using satellite images to follow the migration of Mongolian gazelles in one of the largest temperate grasslands in the world to teasing apart the best way to freeze and thaw clouded leopard semen in a laboratory in Washington, D.C.

The Zoo's programs cover the entire spectrum of conservation action, from high-tech strategies to create a frozen zoo to high-tech applications to map Asia's remaining wildlife habitats. And they include perhaps the most important element in achieving success in conservation: the education and training of future conservation leaders in each of the countries in which Zoo scientists work.

In the following pages, we briefly introduce the conservation and science that are part of the Zoo's Asia program. Please visit our website at http://nationalzoo.si.edu to explore these topics in depth.

GIANT PANDA

JOHN SEIDENSTICKER / NZP



JESSIE COHEN / NZP

GIANT PANDA BEHAVIORAL/BAMBOO PREFERENCES

Scientists at the Smithsonian's National Zoo work with colleagues at Chinese and other North American zoos to tackle two of the great obstacles to breeding giant pandas (*Ailuropoda melanoleuca*)—why zoo pandas often show little interest in mating, and why zoo male pandas are at times overly aggressive toward prospective mates. After studying zoo pandas in China, National Zoo scientists and their colleagues recommended that enclosures for male pandas contain tall vegetation, climbable trees, and areas set back from close public viewing, as well as nearby scents—scat, or dung, from other pandas. These considerations may reduce stress and get the animals better acquainted with potential mates. Such steps are taken at the National Zoo's giant panda enclosure. Meanwhile, Zoo scientists and their colleagues also conducted the first-ever study of zoo-panda preferences for different species of bamboo, the giant grasses that constitute 99 percent of the bears' diet.

FORAGING/COGNITION

By keeping a careful eye on National Zoo pandas Tian Tian and Mei Xiang, Zoo scientists, keepers, and FONZ volunteers help to improve our understanding of how giant pandas operate, both in zoos and in the wild. Staff keep close tabs on which parts and types of bamboo the pandas prefer, how they use their exhibit, including their dens, trees, and playthings, and especially how they interact with each other. For instance, male Tian Tian employs all known scent-marking postures and female Mei Xiang is using new behaviors since arriving at the Zoo, including bleating and chirping during the breeding season. Zoo scientists also study how efficiently the Zoo's pandas, along with those at Zoo Atlanta and the San Diego Zoo, forage for food within their enclosures. So far, it seems that these pandas primarily rely upon spatial, rather than olfactory or visual, cues to find food. Across consecutive trials, the pandas learned how to improve their foraging efficiency by avoiding locations often lacking food and frequenting more productive sites. This study has important implications for wild panda conservation because it suggests that once pandas find reliable food sources, they may not find new foraging sites easily.

REBECCA SPINDLER / NZP / CRC

WILD PANDA ENCOUNTERS ARE RARE, AND THEIR PRESENCE IS OFTEN INFERRED FROM DROPPINGS OR OTHER SIGNS.

GIANT PANDA

JESSIE COHEN / NZP

MEI XIANG WATCHES TIAN TIAN FROM HER PRECARIOUS PERCH (ABOVE); MEI XIANG IN THE SOLITUDE OF HER TREE (RIGHT).

JESSIE COHEN / NZP

CHARACTERIZING ESTRUS AND PSEUDO-PREGNANCY

Clues for demystifying panda reproduction can be found in surprising places. By testing giant pandas' waste products, Zoo scientists and their colleagues can, without bothering their charges, determine when female giant pandas are ready to breed. This information is crucial for zoos hoping to breed pandas because females are fertile for only one to two days each year. Zoo scientists track urinary estrogens to pinpoint ovulation. For example, urine samples from the Zoo's Mei Xiang contained peak levels of two reproductive hormones on April 26, 2002. The next day, male Tian Tian made his strongest advances toward Mei Xiang, attempting to mount her repeatedly. Fecal samples taken from zoo pandas in China similarly reveal elevated hormone levels, indicating when females are ovulating and ready to mate. Hormone readings also are helping to solve interesting puzzles for scientists because giant panda females that don't conceive are believed to have "pseudo-pregnancies," during which time their hormone levels rise similar to those of pregnant pandas. National Zoo and San Diego Zoo scientists also analyzed urine and fecal samples and determined that perhaps 20 percent of Chinese zoo pandas show no hormone changes at all, skipping one or more years of ovarian cycling. The reason remains a mystery that they someday hope to solve.

JESSIE COHEN / NZP

ARTIFICIAL INSEMINATION AND CRYOPRESERVATION

Given the great challenges in breeding giant pandas in zoos, zoo scientists hedge their bets by using medical techniques, especially artificial insemination and cryopreservation. In 2001, National Zoo scientists visited the China Conservation and Research Center for the Giant Panda at the Wolong Nature Reserve. With Chinese colleagues, they initiated a study comparing how giant panda sperm fared when collected and cryogenically preserved, under both field and laboratory conditions. Preliminary results indicate that giant panda sperm can be easily prepared and cryopreserved both in the lab and in the field, and still retain the same potential for fertilizing eggs, although cryopreserving may slightly decrease the longevity of the sperm. This can be overcome by using more sperm when inseminating a female, or fertilizing eggs in the laboratory. Scientists hope to create a centralized giant panda sperm bank from which samples can be genetically matched and shipped to females, near or far, for artificial insemination. This effort greatly contributes to conservationists' efforts to make the zoo giant panda population self-sustaining.

TIAN TIAN AND MEI XIANG ENJOY PLAYTIME IN 2002.

JESSIE COHEN / NZP

JESSIE COHEN / NZP

PANDA HABITAT IN WOLONG NATURE RESERVE, CHINA.

SUPPORT FOR GIANT PANDA RESERVES

Scientists estimate that perhaps 1,100 wild giant pandas remain in about 25 separate populations, mostly scattered across parts of China's Sichuan and Shaanxi provinces. China maintains a reserve network to protect some of these areas, but many reserves are understaffed, poorly surveyed, and vary in how well they are protected. The National Zoo supports China's conservation of wild pandas in several ways. First, Zoo scientists share their knowledge with Chinese scientists, through training courses, joint studies, and data sharing. Also, Zoo scientists work with Chinese colleagues to find ways to involve local communities in protecting pandas in and around the reserves. In addition, the funds with which the Zoo secures the loan of pandas Tian Tian and Mei Xiang—about $1 million each year for ten years—boosts Chinese panda conservation efforts. The first years' funds, for example, helped Chinese conservationists initiate education programs, refurbish facilities, and strengthen panda monitoring and protection efforts in three underfunded reserves.

GIANT PANDA

RED PANDA

RED PANDA

The Smithsonian National Zoo began breeding red pandas (*Ailurus fulgens*) in 1972, when the first of many litters was born. Over the following two decades, careful husbandry and genetic and demographic management helped build a breeding population that produced more than 120 red pandas at the Zoo and the Conservation and Research Center. In the early 1980s, the Zoo's red panda program became one of the first Species Survival Programs (SSPs), a comprehensive inter-zoo management collaboration that oversees the zoo breeding of endangered and threatened species. In the early days of the program, Zoo scientists also became concerned about wild red pandas. Red pandas are declining over much of their range due to fragmentation and loss of critical habitat (mid-elevation, temperate hardwood forests in the Himalaya graced with a bamboo understory that provides virtually all of the red pandas' food). For years, the Zoo has trained scientists and sponsored the research of field and zoo biologists in northeastern India, Nepal, and China. These researchers continue to learn much about red panda ecology, behavior, and distribution—and, most recently, have focused on how human use of forest resources and local attitudes toward wildlife affect red pandas.

JESSIE COHEN / NZP

JOHN SEIDENSTICKER / NZP

J'NIE WOOSLEY / NZP

JESSIE COHEN / NZP

JESSIE COHEN / NZP

JESSIE COHEN / NZP

SLOTH BEAR CUBS OFTEN GET AROUND COURTESY OF MOM.

SLOTH BEAR

Sloth bears (*Ursus ursinus*) live in both dry and moist tropical forests—what many of us would call jungles—in India, Sri Lanka, southern Nepal, and Bhutan. There, they spend their days, but especially their nights, tearing into termite and ant nests and licking up the insects with their long tongues. They also eat figs, mangoes, other forest fruits, and honey. In the 1970s, Zoo scientists were among the first to study sloth bears in the wild. Now, they are embarking on a thorough set of field studies to map the distribution and abundance of India's wild sloth bears, study the animals' favored termite and ant prey, and ascertain how best to reduce conflicts between bears and humans. This work includes training local students and conservation leaders to carry out studies and conservation programs. Zoo scientists and their colleagues also hope to reintroduce sloth bears to areas where they vanished due to hunting or habitat change, and to help curb the capture of young bears for use as dancing performers.

JOHN SEIDENSTICKER / NZP

SLOTH BEAR HABITAT IN INDIA.

JESSIE COHEN / NZP

SLOTH BEAR

JESSIE COHEN / NZP

SLOTH BEAR

JESSIE COHEN / NZP

PLANNED SLOTH BEAR EXHIBIT

Giant pandas will not be the only bears that will attract zoogoers. The Zoo's Sloth Bear Habitat is prominently featured in plans for the upcoming Asia Trail. This exhibit will be the first encountered by visitors entering the Zoo's Connecticut Avenue gate. From the other side of a clear Plexiglas wall, visitors will be able to watch as nearby bears turn over rocks and logs, climb trees, and grub around in the dirt. The Zoo's sloth bears currently live in an antiquated exhibit a bit off the beaten path. Their new quarters will surely raise public interest in sloth bears while providing them with more stimulating surroundings.

JESSIE COHEN / NZP

FISHING CAT

FISHING CAT ZOO REPRODUCTION

Although fishing cats (*Prionailurus viverrinus*) breed more readily at zoos than clouded leopards, there has been no coordinated effort to manage their breeding, until now. Zoo scientists are collaborating with other North American and Asian zoos to improve zoo-breeding prospects for these Asian cats. They are helping to establish a genetic management plan—the first for any species in Southeast Asian zoos—that will carefully match prospective mates and catalog successful and unsuccessful pairings to ensure a genetically diverse zoo breeding population. This program will provide a model for other efforts to breed rare cats in Asian zoos and elsewhere.

FISHING CATS AND RUSTY SPOTTED CATS IN SRI LANKA

Urban sprawl chews up wildlife habitat not only in the Washington, D.C., metropolitan area but also near large cities and towns worldwide. For example, Zoo scientists are collaborating with Sri Lankan scientists on the first detailed study of human encroachment on fishing cats and rusty spotted cats (*Prionailurus rubiginosus*) taking place in Sri Lankan suburbs. There, patchworks of remaining habitat appear to be sustaining at least the fishing cat. The researchers are also searching for rusty spotted cats, which are often hard to detect but seem adaptable to a variety of habitats. The scientists want to learn about the wild cats' behavior, determine what degree of development they can tolerate, increase public awareness of their plight, and draw up a conservation strategy that will protect them far into the future. Camera-trapping (right) will be an important strategy that will capture the nocturnal cats on film, while geographic information systems (GIS) will help draw up a landscape model that targets protection for key habitats.

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FISHING CAT KITTENS, DING AND DOW, WERE BORN IN THAILAND, A SITE OF NATIONAL ZOO COLLABORATION IN REPRODUCTIVE SCIENCE.

CLOUDED LEOPARD

CLOUDED LEOPARD IN THAILAND

Over the last 20 years, rapid deforestation and illegal hunting have threatened the clouded leopard (*Neofelis nebulosa*) across its range, from Nepal, Bangladesh, and Assam (eastern India) east to Sumatra, Borneo, and eastern China. National Zoo scientists have bred clouded leopards at the Conservation and Research Center in Front Royal, Virginia, for more than 20 years. They, along with colleagues at the Nashville Zoo and other zoos, are lending their support to Thai counterparts in hopes of improving zoo clouded leopard welfare and breeding. Among the steps they are taking: providing a more balanced diet, constructing taller enclosures that allow the cats to climb, and reducing zoo clouded leopards' proximity to larger carnivores, which can cause increased stress. They are often prey to tigers, for example, in the wild. Zoo scientists also train Thailand Royal Forestry Department staff in techniques for censusing wild clouded leopards in the country's parks, and are setting up motion-tripped cameras that capture snapshots of clouded leopards and other wild cats as they pass through the forest. In such places as Khao Yai National Park, they are identifying critical habitats and mapping species distributions—helping to set a solid foundation for future conservation work.

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ASIAN ELEPHANT

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SHANTHI AND KANDULA.

KANDULA

Baby Asian elephant Kandula (*Elephas maximus*) arrived on November 25, 2001, the Zoo's most welcome Thanksgiving present in years. Remarkable not only for his arrival but also his conception, the 325-pound pachyderm was the product of the fourth successful artificial insemination of an elephant in the United States, and only the fifth such occurrence in the world. Zoo scientists collaborated with authorities from around the world to bring about mother Shanthi's pregnancy and see it through to fruition. As part of the planned Asia Trail, the elephant enclosure will be remodeled, greatly expanded, and strengthened to best accommodate the lively male elephant, his mother, and their fellow herd mates. Armed with their increased knowledge of artificial insemination and elephant reproductive biology, the Zoo also hopes to continue its breeding program and expand the size of the Zoo's herd.

ZOO REPRODUCTION OF ELEPHANTS

Today, few elephants come to zoos from the wild, and zoo elephants seldom breed. This leaves Zoo scientists with a great challenge—to boost zoo elephant breeding before the zoo population dwindles. Bringing zoo elephants together is difficult from a logistical standpoint: Bull elephants are often dangerous, while shuttling elephants from one zoo to the next is costly and may stress the animals. Enter artificial insemination—the surgical union of egg and sperm. This technique has enabled a few isolated elephants to breed without ever leaving home. Kandula is a prime example of progress in this area. Zoo scientists are also learning how to detect female elephant health problems, such as uterine fibroids or ovarian cysts, that may inhibit breeding. Other questions remain, such as: Why do seemingly healthy adult females lack normal ovarian activity? In the meantime, scientists hope to improve methods of collecting and freezing sperm from wild and zoo male elephants and establish a reliable bank of diverse elephant sperm for use in regular artificial inseminations. All of this work may help the zoo elephant population reach self-sustaining status in the future.

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HUMAN HABITAT IN THAILAND.

HABITAT LOSS IS A SERIOUS THREAT TO WILD ASIAN ELEPHANTS.

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ASIAN ELEPHANT

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IT'S BATH TIME FOR THIS IMPRESSIVE MALE—AN IMAGE OF WHAT KANDULA WILL BECOME. IN THAILAND, AN ORPHANAGE NOW LOOKS AFTER THE ANIMALS ONCE USED IN THE NOW-BANNED LOGGING INDUSTRY (ABOVE AND LEFT).

DISTRIBUTION AND HABITAT IN ASIA

Large animals that rove over large areas, Asian elephants must now move through habitat patchworks riddled with farm fields and villages. This leads to increased clashes between pachyderms and people, most often to the elephants' detriment. National Zoo scientists use satellite imagery and digital data to map the critical habitats that remain for elephants, tracking where logging occurs, where fires spread, and how expanding roadways fragment these areas (and lead to increased likelihood that poachers can reach elephants). Although scientists estimate that between 30,000 and 40,000 wild Asian elephants live in 13 Asian countries, much remains unknown, including the details of individual population sizes, such as where they thrive or where they are in decline, and to what degree their movements are blocked by spreading agriculture, dams, and other human-made obstacles. To answer the questions, Zoo scientists and their colleagues also monitor a herd of elephants in Myanmar, tracking their movements using global positioning system (GPS) satellite collars. As the answers come to light, Zoo scientists will share their findings with Asian colleagues and work with them in hopes of securing a bright future for Asia's huge wanderers.

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NZP ARCHIVES

MYANMAR'S FORESTS

High-resolution satellite imagery reveals that Myanmar (formerly Burma) retains more than half of the closed-canopy forest remaining in mainland Southeast Asia. But this forest is being lost quickly. Zoo scientists studying images over the last decade have documented the recent landscape changes, specifically noting where the most intact forest areas remain. They have produced the first detailed map that shows recent land changes across Myanmar, information that will help conservationists target and protect vital habitat for such endangered species as tigers, Asian elephants, and Eld's deer.

ELD'S DEER

Once a common fixture in woodlands across Southeast Asia, the Eld's deer (*Cervus eldi*) now occupies a tiny fraction of its former range. Only 1,500 wild Eld's deer remain, and most live in the Chatthin Wildlife Sanctuary in Myanmar. There, Zoo scientists have been working with Burmese conservationists to gather basic information on deer biology and habitat preference, as well as to set up conservation infrastructure. Among other things, they now know that Eld's deer prefer dry forests dominated by lofty trees of the dipterocarp family, and that much of their habitat has been replaced by agriculture. Zoo scientists and their colleagues are also tracking habitat loss using geographic information system (GIS) equipment and remote sensing. On the ground, their challenges include involving local communities as stakeholders in conservation endeavors so that their future is linked with the health of ecosystems vital to deer and other wildlife.

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ELD'S DEER AT THE SMITHSONIAN'S NATIONAL ZOO

At the Zoo's Conservation and Research Center in Front Royal, Virginia, Eld's deer thrive. More than 100 have been born there, and 17 of these were conceived via artificial insemination. Zoo researchers continue to hone *in vitro* fertilization methods. The Zoo also maintains a Genome Resource Bank for storing cryogenically preserved Eld's deer sperm.

ELD'S DEER

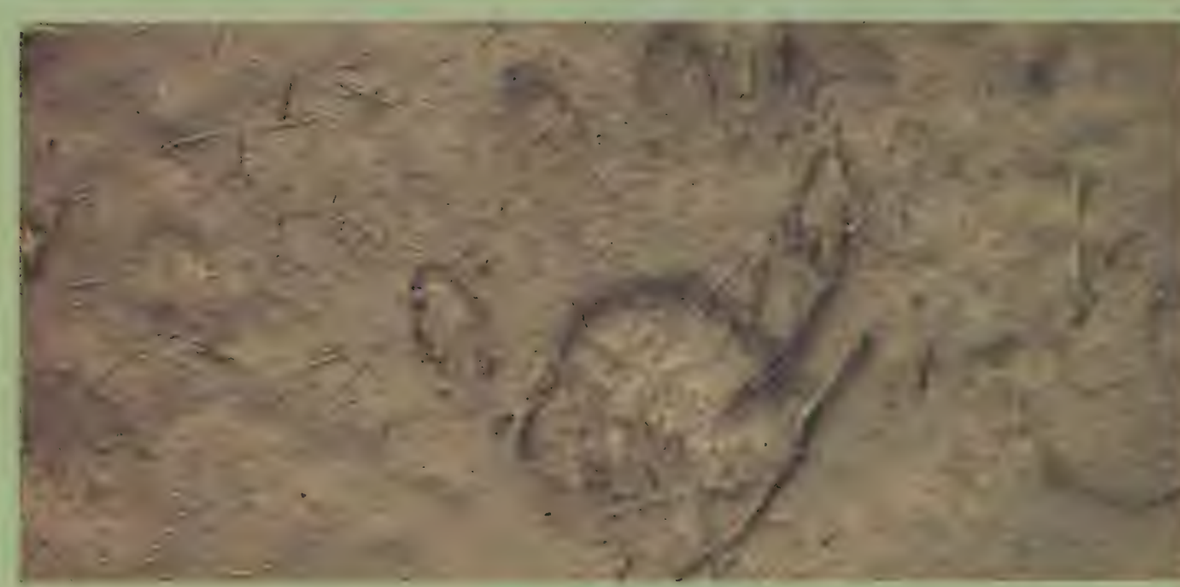
TIGER

JOHN SEIDENSTICKER / NZP

TIGER CONSERVATION

Fewer than 7,000 tigers (*Panthera tigris*) still roam in remaining habitat patches from India to Sumatra and up to the Amur region of Russia. Tigers are already gone from Bali, Java, and the area around the Caspian Sea. All remaining tiger populations are very small and isolated from one another and are thus vulnerable to inbreeding and devastation from chance events, such as drought, poaching, and fires. In addition, only about 20 percent of remaining tiger habitat falls within protected areas, and people over-hunt tigers' essential prey—deer and wild pigs—in much of the remaining habitat that could support tigers. Some of the world's preeminent tiger experts work at the National Zoo or were trained there. They and other conservationists hope to save tigers by reducing illegal hunting of tigers for their bones and other body parts (which are highly prized in traditional Chinese medicine), protecting large remaining habitat blocks, and ensuring the sound management of deer and wild-pig populations.

SUSAN LUMPKIN / FONZ



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TIGER

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BERANI AT THE ZOO'S LION/TIGER HILL (ABOVE AND RIGHT).

TIGER BREEDING

As far as tigers go, Sumatran tigers are among the most richly marked, smallest, and rarest. The National Zoo has become a critical and productive breeding center for this rare subspecies, which is threatened by habitat loss and poaching. The Zoo's breeding program helps maintain a healthy zoo population of tigers that could provide a hedge against extinction, because only about 300 Sumatran tigers remain in the wild. Also, the Zoo provides one of the few places where people can watch and learn about these imperiled cats. In the field, Zoo scientists have worked to secure a future for wild Sumatran tigers for 25 years. They are redoubling their efforts as this endangered great cat continues to slide toward extinction.

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GREATER ONE-HORNED ASIAN RHINO

About 2,400 wild greater one-horned Asian rhinoceroses (*Rhinoceros unicornis*) roam fragmented sub-Himalayan grasslands in several parks in northern India and in Nepal. In addition to widespread habitat loss, these confined wild populations face the dangers of drought and illegal hunting. About 140 of these rhinoceroses live in zoos around the world. This population supports the wild one in two ways: It provides a pool of animals for possible future reintroduction and it gives zoo scientists a close-up look at the mysteries of rhino biology, particularly the animals' physiology, behavior, and environmental interactions. Improved understanding of these factors will smooth the way for future efforts to conserve wild rhinos and breed those in zoos. As with other zoo animals such as pandas, Zoo scientists study the Zoo's greater one-horned Asian rhinos' hormones via samples taken of their urine, feces, and saliva. Hormone levels can reveal if animals are ready to breed or if they are undergoing stress.

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WILD GREATER ONE-HORNED ASIAN RHINOS INDIGENOUS TO NEPAL (TOP LEFT AND ABOVE) AND THE ZOO'S OWN MOTHER AND CALF (OTHERS).

ASIAN RHINO

GIANT SALAMANDERS

GIANT SALAMANDERS

The world's largest salamanders inhabit scenic, fast-flowing mountain rivers in Asia. These wrinkled denizens of cold water belong to the same family as North America's hellbender (*Cryptobranchus alleganiensis*). The Japanese giant salamander (*Andrias japonicus*) is the largest species, reaching lengths of up to five feet. This impressive creature inhabits remote streams on northern Kyushu and western Honshu islands in Japan. Soon a few will likely reside at the Zoo's Asia Trail and Reptile Discovery Center. The Chinese giant salamander (*Andrias davidianus*) is somewhat smaller, and occurs in and along tributaries of the Pearl, Yellow, and Yangtze rivers in China. In the wild, giant salamanders breed in September, when their cool streams have the highest temperatures of the year. Habitat alteration—especially the channeling or damming of rivers and deforestation—destroys giant salamander habitat. Both species are endangered, and have been hunted as delicacies and for use in traditional Chinese medicine.

SUMIO OKADA

SUMIO OKADA

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GHARIAL

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GHARIAL

One of the world's largest crocodilians poses no threat to people, yet faces many from them. The gharial's needle-like snout, studded with small, pointy teeth, reveals that these beefy reptiles (*Gavialis gangeticus*) don't hunt large, strong prey like their famed cousins, the Nile and saltwater crocodiles. Instead, gharials seek fish, frequenting slow-flowing river courses primarily in India and Nepal, with a few likely hanging on in Pakistan, Bhutan, Bangladesh, and possibly Myanmar. There, the up-to-21-foot-long reptiles wait for fish, snapping them up with a sideways thrash of the neck, then gulping them down above water. Smithsonian Institution scientists helped initiate a breeding program for Nepal's gharials after the reptiles declined due to habitat loss, hunting, and drowning in fishing nets. Breeding facilities today can produce more than enough gharials. The problem is that not

enough undisturbed habitat remains in which to release them. Wild numbers are now up to 3,000 after some rebounds brought on by conservation programs in India and Nepal. You can spy on the Zoo's gharials by checking out the underwater Gharial Cam at http://www.nationalzoo.si.edu/webcams/gharial.htm.

KOMODO DRAGON

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KOMODO DRAGON

Found only on three remote Indonesian islands, Komodo dragons (*Varanus komodoensis*) can reach ten feet long and weigh more than 350 pounds. The National Zoo was among the first institutions to participate in zoo breeding of Komodo dragons, the world's largest lizards. And, it was at the National Zoo that the first Komodo dragons broke out of their eggs outside of Indonesia. A new enclosure now allows the Zoo's male Precious and female Kraken to roam both indoors and out during the warmer months. In the wild, Komodo dragons eat carrion and also prey on deer, wild pigs, smaller Komodo dragons, and livestock including goats. At the Zoo, keepers feed these robust reptiles dead rats, mice, rabbits, and,

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occasionally, chickens. Since 1992, the Zoo has reared 55 Komodo dragons, which have been distributed to about 30 zoos around the world. Play behavior in reptiles is very rare, but Zoo scientists have conducted a play behavior study on Kraken, documenting her unusual interactions with her caretakers, some of them reminiscent of how dogs play with their owners.

SEA TURTLES

To better understand the complex lives and conservation needs of sea turtles, Asian scientists and their Zoo scientist colleagues have attached satellite transmitters on olive Ridley turtles (*Lepidochelys olivacea*) in Orissa, India, as well as green turtles (*Chelonia mydas*) from the Turtle Islands, between Sabah, Malaysia, and Tawi-Tawi, Philippines. Sea turtles can travel thousands of miles, crossing international boundaries. The data collected from tracked turtles will help conservationists get a clearer picture of what these long-lived ocean wanderers need to survive. Hunted for their meat, skin, and eggs, caught ever more frequently in fishing gear, and facing habitat loss on their few key nesting beaches, these turtles face an uncertain future.

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SEA TURTLES

MONGOLIAN GAZELLE

MONGOLIAN GAZELLE

Mongolia's eastern steppes are among the largest remaining grasslands in the world. There, herds of Mongolian gazelle (*Procapra gutturosa*) annually migrate between their calving and wintering grounds. These herds range in size from 35,000 to 80,000 and provide a spectacle on par with the hordes of bison that once roamed North America's Great Plains. However, over the past 50 years, Mongolian gazelle numbers have dropped and their geographic range has shrunk to one-third of what it was in 1950. Zoo scientists and their colleagues are using geographic information system (GIS) technology to map out the most productive feeding areas along the gazelles' migratory routes and are pinpointing the most important areas for habitat and gazelle conservation in hopes of stemming the gazelle declines.

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SCIENTISTS COVER VAST AREAS OF THE MONGOLIAN STEPPE TO HAVE A RARE ENCOUNTER WITH MONGOLIAN GAZELLES (MIDDLE RIGHT)—MORE COMMONLY NOW, THEY FIND CATTLE (TOP).

PITOHUIS

PITOHUIS

While banding birds deep within a Papua New Guinean tropical forest, Jack Dumbacher, now a research associate at the National Zoo, was scratched by a bright orange and brown bird called a hooded pitohui (*Pitohui dichrous*). After handling the bird, Dumbacher touched his hand to his mouth and felt a strong tingle. As Dumbacher suspected, and he and other researchers later confirmed, this common bird carries a toxin. Years after this 1989 revelation, Dumbacher continues to study pitohuis to unravel the mysteries of how and why they acquire batrachotoxins (BTX), the same type of substance found in the skin of New World poison dart frogs. It is now known that several pitohui species and another New Guinean bird called the blue-capped ifrita (*Ifrita kowaldi*) carry BTX. The scientists think the birds use the substance to protect themselves from parasites and possibly predators. No one yet knows how the birds acquire the toxin—from insects, plants, or a combination of food sources. Chasing the answers, Dumbacher and other scientists keep returning to New Guinea in search of toxic birds.

POISONOUS SKIN HELPS PROTECT THE HOODED PITOHUI (ABOVE) AND THE BLUE-CAPPED IFRITA (BOTTOM RIGHT).

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GUAM RAIL

GUAM RAIL

After habitat destruction, introduced species are the second greatest threat to the world's birds. The Pacific island of Guam provides a textbook example of the perils posed by exotic species. In the late 1940s, brown tree snakes (*Boiga irregularis*) found their way, most likely via military equipment, to the remote island. Since then, the serpents have thrived, and eaten the island's native birds, reptiles, and other wildlife in many cases out of existence. The once-plentiful Guam rail (*Gallirallus owstoni*), a flightless bird, had nowhere to hide. In the 1980s, Zoo scientists helped to corral the last few birds and to start a zoo breeding program. This last-ditch effort probably saved the species. Guam rails breed well in zoos, and the current world zoo population is about 200. In 1989, Guam rails were introduced to the nearby snake-free island of Rota, and this population now appears to be established and increasing. Rails are now being released into the wild on Anderson Air Force Base in northern Guam in an area where brown tree snakes are being actively controlled. This effort was initiated after a 1997–1999 pilot project on Guam demonstrated successful reproduction within a 150-acre enclosure where snakes were being culled.

KINGFISHER

MICRONESIAN KINGFISHER (GUAM)

Although two subspecies of Micronesian kingfishers still survive on Pohnpei and Palau, Guam's endemic subspecies (*Halcyon cinnamomina cinnamomina*) was extirpated in the mid-1980s, a victim of the voracious introduced brown tree snake. In order to save the species from certain extinction, the last 29 wild Guam Micronesian kingfishers were captured and transferred to mainland zoos for breeding. Scientists from the National Zoo and their colleagues have worked hard to sustain and breed these birds. Along the way, they have learned a lot about kingfisher behavior, diets, and accommodation requirements. Today, about 65 kingfishers reside in mainland zoos. The Zoo will be sending three kingfishers to Guam in the summer of 2003 to establish a zoo breeding population on the island as a prelude to reintroduction. The plan is to reintroduce zoo-bred kingfishers to appropriate habitats on Guam as soon as brown tree snake control measures are underway.

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ORANG UTAN

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ORANGS AND COGNITION

Phantom frugivores of the disappearing tropical forests of Sumatra and Borneo, orang utans (*Pongo pygmaeus*) reveal their striking intelligence at the Zoo's Think Tank exhibit. There, since 1995, scientist Rob Shumaker has worked with Zoo orang utans to examine how Asia's largest primates can master language skills, use arabic numbers, and make judgments about quantity. Referring to the quantity judgment task, Shumaker says that the "...orang utans use a variety of cognitive skills to make the optimal choices, and their skills are comparable to adult humans." Among the things learned by Zoo orang utans: how to choose smaller quantities of objects to receive larger rewards and how to communicate via symbolic language using touch-screen computers.

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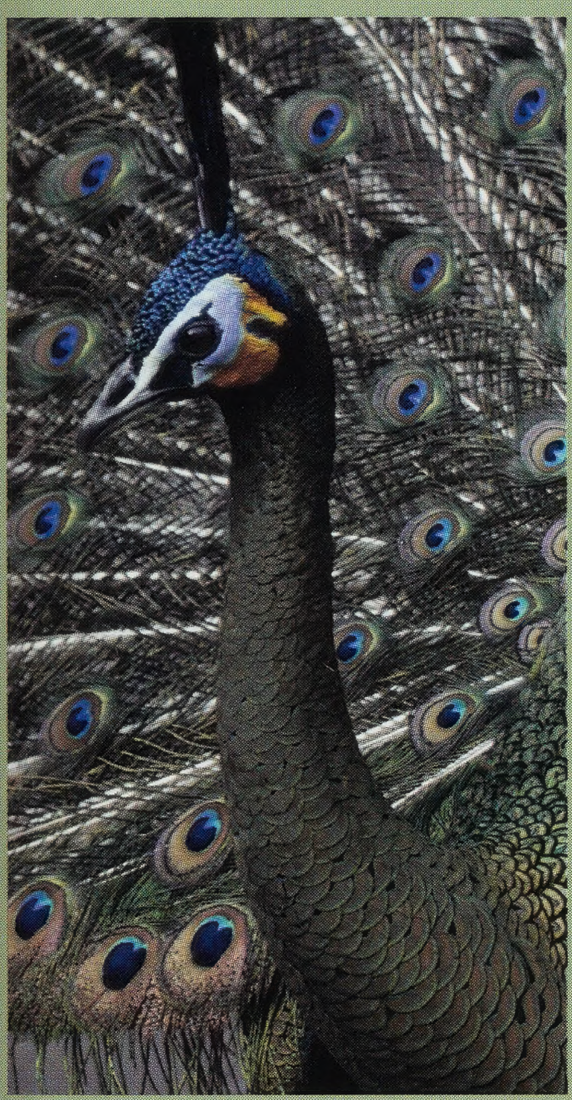

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JAVA GREEN COCK (*PAVO MUTICUS MUTICUS*).

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REEVE'S MUNTJAC (*MUNTIACUS REEVESI*).

JESSIE COHEN / NZP

WILLIAM MCSHEA / NZP

ZOO DIRECTOR LUCY SPELMAN TEACHING BEAR EXAMINATION TECHNIQUES, TANGJIAHE, CHINA.

TRAINING PROGRAMS FOR ASIAN CONSERVATIONISTS

In many parts of the world, field biologists, decision-makers, scientists, and students receive valuable training from courses and workshops taught by Zoo scientists. National Zoo scientists are committed to sharing their expertise with the next generation of conservationists and have had a global impact on building capacity for biodiversity protection. Over the past 22 years, Zoo scientists have helped train or educate over 1,200 of Asian conservationists—from zoo staff to field biologists to wildlife officials—in China, India, Indonesia, Malaysia, Myanmar, Nepal, the Philippines, Sri Lanka, Taiwan, Thailand, and Vietnam. This work helps protect rich wildlife diversity in the world's most densely populated region, and helps bring people closer to a more natural balance between humanity and nature.

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WOLONG HABITAT, CHINA (ABOVE); MEI XIANG AT THE ZOO (CENTER).

CONSERVATION TRAINING

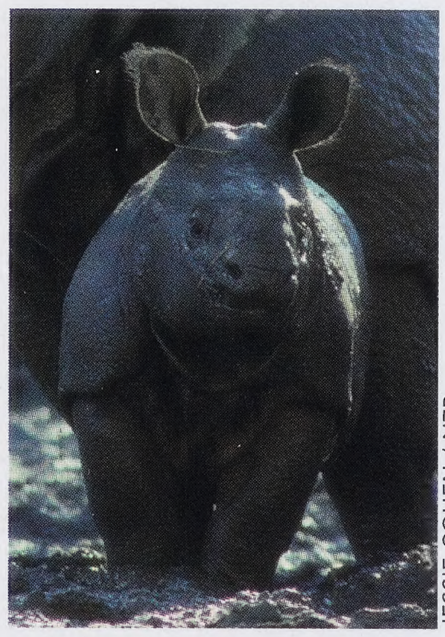
BIO ALMANAC

There is much good news for wildlife coming out of China recently. China now has 1,405 nature reserves, covering an area roughly three-quarters the size of Alaska. This coverage is said to provide habitat protection for 85 percent of China's animal species and 65 percent of its wild plant species. While some of these reserves are poorly staffed or not staffed at all, several international organizations, including the Smithsonian's National Zoo and the World Wildlife Fund (WWF), are offering support to improve the capacity of China's reserve system and to devise ways to generate revenue for parks and jobs for local people.

In Sichuan Province's Wanglang giant panda reserve, for instance, WWF has supported the creation of a modern ecolodge that hosts small ecotours. WWF hopes to show that Chinese people can derive economic benefit from reserves without negatively impacting the ecosystem. This is especially important in Sichuan, where the logging ban imposed in 1998 devastated local economies. While the logging ban is good for the conservation of giant panda habitat, and will serve to reduce erosion and flooding (the primary goal of the ban), the needs of local people must also be met if conservation efforts are to be sustained in the long-term.

China is committing significant resources to conserve its biodiversity. The Chinese government announced recently that it intends to invest about $6 billion in conservation by 2005. Among other things, these funds will support the establishment of more nature reserves, scientific research to document biodiversity, and the improvement of laws and regulations related to the protection of biodiversity.

Continued conflict between Maoist rebels and government forces resulted in increased killings of greater one-horned Asian rhinos (*Rhinoceros unicornis*) in Nepal last year. In just one month, eight rhinos were poached for their horns and other valued parts. The state of emergency that was declared in December of 2001 has meant a reduction in the military presence in the Royal Chitwan National Park in central Nepal and the Royal Bardia National Park in the west. Poachers have been emboldened by the reduction of more than two-thirds of security check points, resulting in the poaching of 25 rhinos in Royal Chitwan National Park last year.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In the latter half of the 1990s, the population of this species increased by 31 percent in Nepal, and by more than ten times overall since the 1960s, when India and Nepal began protecting them. In 1999, poaching accounted for only a third of deaths, but that figure increased to 75 percent last year. The current population stands at about 2,400 animals.

In addition to the illicit value of their horns, hides, and other body parts, rhinos also experience pressure from habitat loss due to land conversion for agriculture, logging, and commercial plantations. Having such small populations leaves the animals open to threats from inbreeding and natural disasters.

WHAT'S IN A NAME

In the nineteenth century, Britain and Russia sent explorers into the wilds of Asia in what was known as the "Great Game," each seeking advantage and control of the continent. The names of the players in this game are prominent among the scientific and common names of Asian species.

Nikolai Przewalski, a Russian player, made four excursions through western China, Mongolia, and Tibet. He documented the geography and wildlife of the Gobi desert, where he found wild ancestors of the domestic horse and camel. In all, he collected more than 9,000 specimens and recorded hundreds of plant and animal species that were new to science, including the wild Bactrian camel (*Camelus bactrianus ferus*) and Przewalski's horse (*Equus callabus przewalskii*), or takhi. Today, there are only about 300 Bactrian camels alive in the Gobi, and takhi, the last species of wild horse, exist in the wild only due to recent reintroductions in Mongolia, made possible, in part, by captive-breeding programs at the Smithsonian's National Zoo.

British player W.G. Thorold identified the white-lipped deer (*Cervus albirostris*), also known as Thorold's deer. Strangely, Przewalski originally documented this species in 1879, but it was Thorold who obtained the second and third specimens from Tibet in 1891. John Reeves—also on the British side—was formally a tea inspector in China when the Great Game kicked off in the early 1800s, but is remembered as a naturalist. He collected species of deer and pheasant that now populate Britain. A diminutive Asian deer, called Reeve's muntjac (*Muntiacus reevesi*), roams the English countryside today in feral herds numbering 40,000. Another British gamer was Lieutenant Perry Eld, who is recognized for documenting a cervid (or deer) in India's Manipur Valley in 1838. The two subpopulations of Eld's deer (*Cervus eldi eldi*) reside in Burma (where it is commonly known as thamin) and in India (known as sangai).

Russian star Peter Pallas was also a prolific naturalist. Catherine the Great recruited Pallas from Germany to join the Academy of Sciences in St. Petersburg. In 1769, Pallas ventured to Siberia with an expedition that observed the transit of Venus. In the following five years, he explored the upper Amur, the Caspian Sea, and the Ural and Altai mountains. In all, he described some 220 new species of plants, 45 mammals, and 78 birds.

Some suggest that these naturalist/explorers in the Great Game were spies, but if they were, then they did a fair bit of moonlighting for the sake of science, and attached their names prominently to their work to prove it.

—*Brendan Horton*

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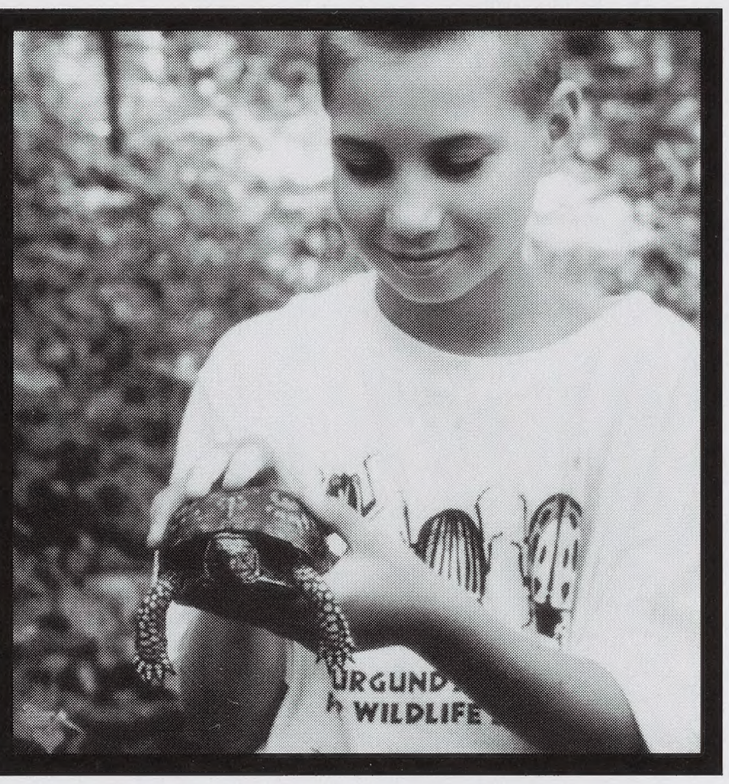

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Saturday, May 10 at 10:30 am
Ages 6 and up

Join us for the original 1955 Walt Disney animated classic!

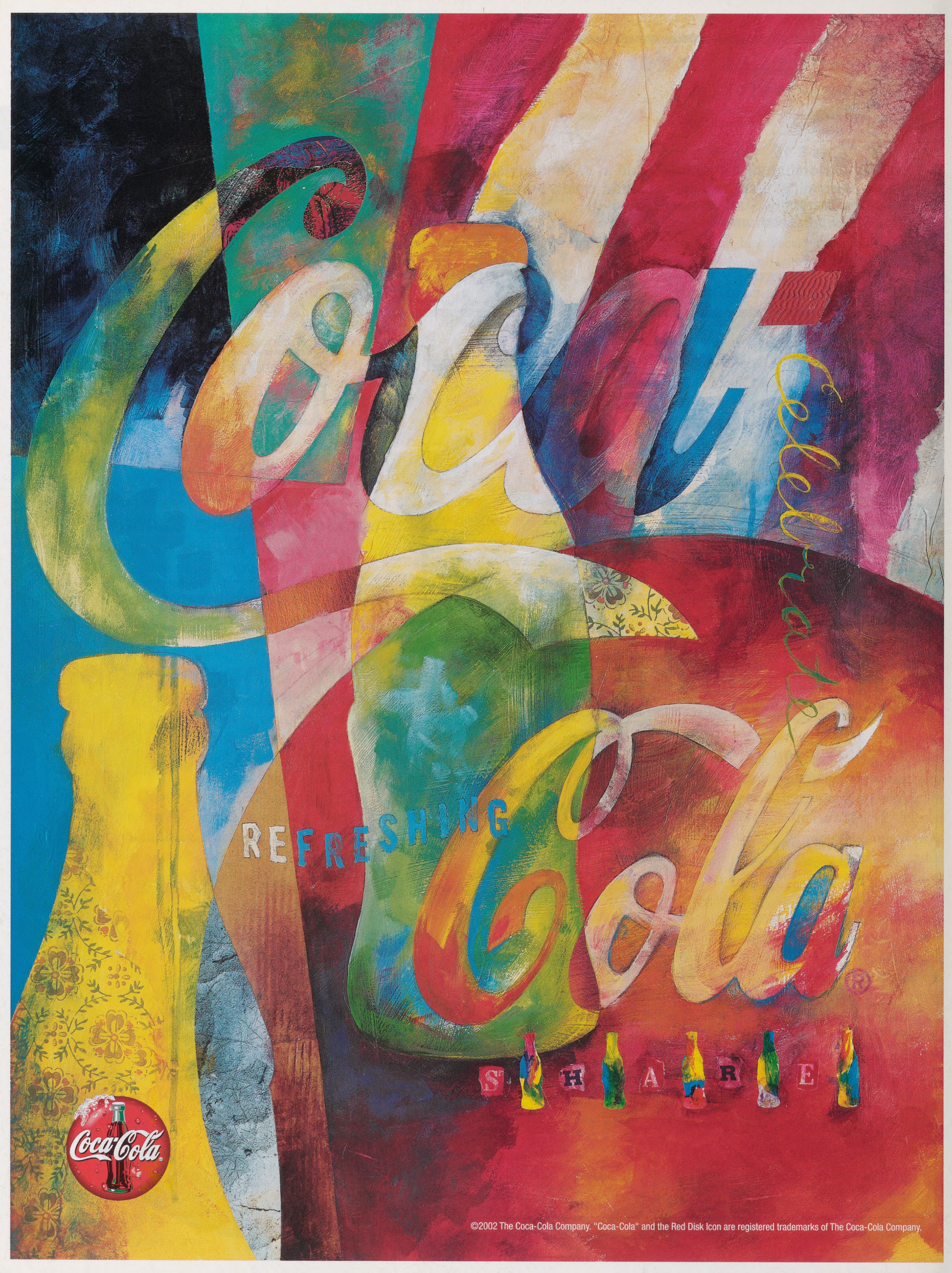
National Gallery of Art

On the National Mall at Fourth Street and Constitution Avenue, NW
Admission is always free. Monday – Saturday 10 – 5, Sunday 11 – 6
General Information: 202-737-4215 TDD: 202-842-6176 *www.nga.gov*

Guided Horseback Trail Rides

Indian Hollow Stables
Raymond R. "Andy" Guest Jr.
Shenandoah River State Park
Bentonville, VA
(540) 636-4756

www.dcr.state.va.us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